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Nº 12

CIA RR FR 65-12  
May 1965

## INTELLIGENCE REPORT

USSR: PORTS AND PIPELINES  
FOR EXPORTING OIL

DIRECTORATE OF INTELLIGENCE  
Office of Research and Reports

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FOREWORD

The continuing efforts of the USSR to expand the capabilities of those ports and pipeline systems that handle oil for export are described in this report. Current capabilities are analyzed against current requirements, and prospects for the future are examined. Emphasis is given to the possible limitations that ports and pipelines may place on future increases in Soviet oil sales.

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USSR: PORTS AND PIPELINES FOR EXPORTING OIL\*

Summary and Conclusions

During 1960-63, exports of oil from the USSR to other Communist countries and to non-Communist countries increased annually by an average of almost 20 percent to more than 51 million tons. With only minor exceptions, the USSR has honored its trade commitments in full, in both quality and quantity. This has meant not only the successful coordination of production, transportation, and shipping schedules but also the concomitant expansion of means of transport and loading as the volume of exports increased from year to year.\*\*

Port facilities have been upgraded, facilities for handling oil and tankers have been enlarged, and new ports for exporting oil have been established on the Black Sea and the Baltic Sea. Although facilities probably have been strained to meet the demands placed on them, these demands generally have been satisfied -- to date neither ports nor pipelines have been a limiting factor in the Soviet drive to enlarge participation in the international oil market. The limitation, if there has been any, has rested with restrictions on the amount of oil the USSR could make available for export.

That the USSR fully intends to increase its exports of oil in the coming years is quite clear, and much of the groundwork for handling this anticipated increase has already been carried out. Current CIA estimates place the amount of exportable surplus oil in the USSR in 1970 at between 79 million and 107 million tons, which implies an average annual growth in exports of 6 percent to 11 percent during 1964-70. For comparison, in the preceding 7-year period, total oil exports increased from 10 million to more than 51 million tons, or by 26 percent annually.

New oil pipelines have been laid to the Black Sea ports of Tuapse and Novorossiysk (Mys Sheshkharis), the Baltic Sea port of Ventspils will be linked by pipeline with sources of oil supply in 1965, and construction is to begin in 1965 on a second oil pipeline between the export base at Batumi and the Baku oilfields. Delivery of crude oil to Czechoslovakia, East Germany, Hungary, and Poland will be handled largely by the recently completed CEMA (Council for Mutual Economic Assistance), or Friendship, pipeline.\*\*\*

\* The estimates and conclusions in this report represent the best judgment of this Office as of 1 April 1965.

\*\* In this report, the term oil is meant to include both crude oil and petroleum products. Tonnages are given in metric tons. The term other Communist countries includes the European Satellites (Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Rumania) as well as Communist China, Cuba, and Yugoslavia.

\*\*\* As much as 28 million tons of crude oil, representing from 26 percent to 35 percent of the Soviet exportable [footnote continued on p. 2]

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Of paramount importance to continuing Soviet export of oil will be the new base for exporting oil that is nearing completion at Mys Sheshkharis, just a few kilometers southeast of Novorossiysk. Test delivery of oil from this new facility, which on completion in 1966 will rank as the largest in the USSR, began late in 1964. Reportedly, the port will be able to accommodate tankers of 100,000 deadweight tons (DWT)\* and at full operation will almost double the capacity of all the ports on the Black Sea to export oil. Finally, expansion of the Soviet tanker fleet continues through construction both in foreign and domestic yards. On the basis of improving the means to deliver oil to points of export and the continuing enlargement of port capacities -- particularly Mys Sheshkharis -- it is estimated that at least through 1970 ports and pipelines will not be a limiting factor in Soviet sales of oil.

The recent emergence of the Baltic ports of Klaipeda and Ventspils as important suppliers of oil to Scandinavia and Northern Europe reflects recognition of the need to establish points of supply much closer to these market areas than the distant Black Sea ports. Nevertheless, silting is so severe and dredging, which is needed to keep the channel open to the required depth, so costly that Klaipeda may never achieve its role as a major oil port.

At the Black Sea ports both natural and manmade limitations often interfere with shipping schedules. Although icing is not a particular problem, coastal storms in winter months often force the harbors to close. Moreover, the ports are hindered by notoriously low-capacity discharge pumps that seriously hamper loading operations -- in fact, there seems to be a reluctance on the part of Soviet planners to allocate funds necessary to permit replacement of these pumps. If the need to improve pumps continues unheeded, a serious bottleneck could develop in meeting delivery schedules. Moreover, lack of improvement in loading rates would negate those advances made in delivering oil to port areas and in accommodating larger tankers in greater numbers.

Except for Odessa and Feodosiya, which depend on rail transport for the supply of oil, all major ports on the Black Sea and Baltic Sea either now are served by pipeline or soon will be -- plans and construction are well underway to provide such services. Some of these pipelines will obviate deliveries by rail tank car and permit movement of oil at reduced costs, in larger quantities, and on more secure schedules. Nevertheless, delivery problems may occur until all pipelines serving ports can be linked directly with fields producing crude oil.

surplus, may be moved to Eastern Europe by this pipeline system in 1970. Because carrying capacity of that part of the Friendship line within Eastern Europe will be inadequate to handle this amount, plans have been formulated to parallel existing lines within Poland, East Germany, Czechoslovakia, and Hungary.

\* For a definition of this term and of others commonly used in shipping, see Appendix B.



I. Ports as a Factor in the Export of Oil from the USSRA. Current Role

In recent years the USSR has emerged as an important international marketer of crude oil and petroleum products, and there has been a considerable shift in emphasis on the means used to transport this oil to its ultimate destination. Increasing reliance has been placed on transporting export oil by oceangoing tanker.\* In 1958, for example, 54 percent of the oil exported was moved by oceangoing tanker, but by 1963 this share had increased to 68 percent (see Table 1\*\*). Inasmuch as almost all of the oil sold to non-Communist countries is delivered by tanker (97 percent in 1963\*\*\*), this shift, then, reflects the relative increase in sales to countries outside the Bloc.

Some rearrangement is taking place in the other means of transporting oil (rail, inland waterways, and pipeline). In 1960 all the crude oil for export that was moving inland was carried by rail or by tankers and barges on the inland waterways (as distinct from oceangoing tanker). Since early 1962 the use of parts of the CEMA, or Friendship, pipeline as they were completed has reduced the movement of crude oil by rail and inland waterway. Of the total 9.9 million tons of crude oil for export that was moved by inland means in 1963, 4.5 million tons, or 45 percent, were handled by the CEMA pipeline. Within the next several years, as the CEMA pipeline is brought to its full capacity, expectations are that most of the crude oil for export that is moving inland will be handled by the pipeline.

Most of the petroleum products moving inland continue to be handled by rail, and lesser amounts are being shipped by inland waterway. No pipeline for petroleum products crosses international boundaries to serve the export market, and except for speculation regarding

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\* Through a combination of construction in both Communist and non-Communist yards, the Soviet tanker fleet has increased rapidly in recent years. At the end of 1964 the Soviet tanker fleet totaled about 2.5 million DWT, compared with only slightly more than 0.8 million DWT in 1958. A further growth to 3.2 million DWT by the end of 1965 is forecast. Continued acquisition of tankers of varying capacities is dictated by the expressed Soviet hope of having in the near future a tanker fleet capable of delivering all export oil sold c.i.f.

\*\* P. 4, below.

\*\*\* In that year, Finland received 0.15 million tons of petroleum products by rail; Afghanistan received 0.1 million tons of products overland; Austria received all of its oil imports from the USSR -- 0.5 million tons -- by combined inland waterway and rail; similarly, Soviet exports of products to Switzerland -- 0.07 million tons -- were handled by inland water and rail.

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Table 1

USSR: Method of Delivering Oil for Export  
1960-63

	<u>Maritime, by Area of Origin <sup>a/</sup></u>				Maritime as Percent of Total	<u>Inland Transport, by Type</u>			Inland as Percent of Total	<u>Total</u>
	Million Metric Tons					Million Metric Tons				Million
	Black Sea	Baltic Sea	Sakhalin Island	Total Maritime		Rail and Water <sup>b/</sup>	Pipeline <sup>c/</sup>	Total Inland <sup>b/</sup>		Metric Tons
1960										
Crude oil	9.4	0	0.1	9.5	53.4	8.3	0	8.3	46.6	17.8
Petroleum products	8.8	1.3	0	10.1	65.6	5.3	0	5.3	34.4	15.4
1961										
Crude oil	16.3	0.2	0.6	17.1	73.1	5.5	0.8	6.3	26.9	23.4
Petroleum products	8.9	2.0	0	10.9	61.2	6.9	0	6.9	38.8	17.8
1962										
Crude oil	13.7	2.3	0.6	16.6	63.1	7.2	2.5	9.7	36.9	26.3
Petroleum products	10.1	1.9	0	12.0	62.8	7.1	0	7.1	37.2	19.1
1963										
Crude oil	16.4	3.5	0.4	20.3	67.2	5.4	4.5	9.9	32.8	30.2
Petroleum products	12.5	2.1	0	14.6	69.2	6.5	0	6.5	30.8	21.1

a. Estimated.

b. Residual. Only relatively small quantities are handled by inland waterways.

c. Deliveries of crude oil to Eastern Europe by the Friendship pipeline.

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the possible construction of an oil pipeline from the USSR to Finland, it is unlikely that any such pipeline would be built.

Except for those minor quantities of Sakhalin crude oil that are exported to Japan through the Soviet Far East port of Moskal'vo,\* exports of oil through ports of the Black Sea and the Baltic Sea reflect Soviet activity in maritime oil shipments. The export of oil from Black Sea ports has increased steadily in recent years -- from 18.3 million tons in 1960 to 28.8 million tons in 1963 -- and in the latter year, such exports represented 83 percent of the total oil for export that is moving by oceangoing tanker. [REDACTED]

[REDACTED] From 1960 to 1963, Odessa, Tuapse, and Batumi handled between 87 and 94 percent of the petroleum products moving in export trade from the Black Sea (see Table 2,\*\* the map, Figure 1,\*\*\* and the chart, Figure 2\*\*\*). Batumi held the lead in tonnage at the beginning of the period, but by 1963, both Tuapse and Odessa had surpassed Batumi as exporters of petroleum products.

The developing market for Soviet oil in Scandinavia and Northern Europe, when measured against the long and profit-consuming hauls required if this oil were to be shipped from Black Sea ports,† led the USSR to develop two ports on the Baltic Seatt -- Klaipeda and Ventspils -- which, in addition to being comparatively inactive, possessed natural features that were thought to be conducive to rapid development as major ports.

Initial shipments of products\* were made from Klaipeda in 1959, but only negligible quantities were involved. Facilities for loading petroleum at Ventspils were not placed in operation until late 1961, and only 200,000 tons of crude oil passed through the port that year.

In the succeeding 2 years, exports of oil from Klaipeda and Ventspils increased by more than 150 percent to 5.6 million tons, a quantity that represented 16 percent of the total movement of petroleum by tanker from the USSR. Yet the assumption by these ports of a leading role in moving crude oil and petroleum products by tanker from the USSR has not relieved to any great extent the general congestion

\* See p. 7, below.

\*\* P. 6, below.

\*\*\* Following p. 6.

† Shipments from the Baltic to Scandinavia and Northern Europe involve a combination of long pipeline hauls and short tanker movements. The reverse is true for oil delivered out of the Black Sea. The cost advantage of using Baltic Sea ports is quite clear when noting that pipeline costs in the USSR average 11.6 kopecks per 100 ton-kilometers compared with 14.0 kopecks per 100 ton-kilometers for maritime shipment.

†† Reduced reliance on the Black Sea and the availability of ports on the Baltic Sea also have strategic values.

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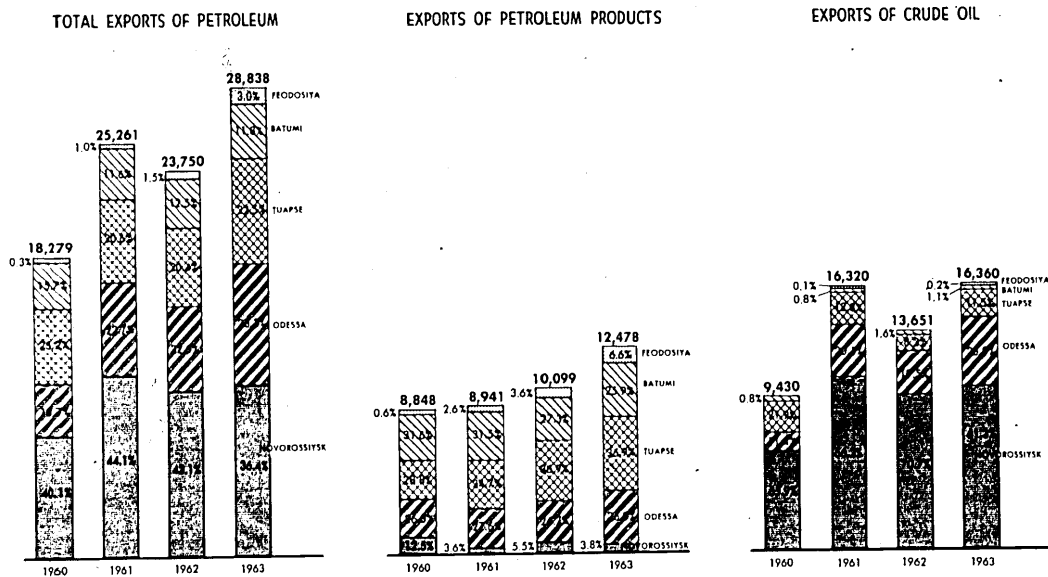
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USSR: Exports of Petroleum, Petroleum Products, and Crude Oil  
from the Black Sea, by Port of Origin, 1960-63

Thousand Metric Tons

Figure 2



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in the Black Sea, inasmuch as the total quantities of oil moving in export trade have continued to rise steadily. (For exports of oil out of the Baltic Sea, according to port of origin during 1959-63, see Table 3.)

Table 3

USSR: Exports of Oil From Baltic Sea Ports  
1959-63

Million Metric Tons			
Year	Ventspils (Crude Oil)	Klaipeda (Petroleum Products)	Total
1959	0.0	Negl.	Negl.
1960	0.0	1.3	1.3
1961	0.2	2.0	2.2
1962	2.3	1.9	4.2
1963	3.5	2.1	5.6

Through 1964 all of the oil shipped from these Baltic ports had to be brought in by rail. The USSR had recognized this limitation and originally had scheduled the construction of two oil pipelines -- one for crude oil, to terminate at Ventspils, and one for petroleum products, to terminate at Klaipeda. Presumably because of the difficulty in maintaining adequate water depth in the harbor, the project to build a pipeline to Klaipeda has been either abandoned or postponed indefinitely; but construction of a pipeline to Ventspils for crude oil was begun in 1964, and plans call for completion of this system in 1965.

Only one port in the Soviet Far East -- Moskal'vo -- is actively engaged in handling oil for export. This port, which is located on the northern tip of Sakhalin Island and close to fields producing crude oil, handles those small amounts of Sakhalin crude oil destined for Japan, as illustrated in the following tabulation (in million tons):

Year	Amount
1960	0.1
1961	0.6
1962	0.6
1963	0.4

No other exports of oil are shipped from Moskal'vo; those to Japan in 1963 were equivalent to only about 1 percent of oil exported by tanker.

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Increases in the export of oil from Moskal'vo to Japan or to any other destination are unlikely for a variety of reasons. First, production of crude oil on Sakhalin Island is quite limited and falls far short of meeting requirements for the Soviet Far East. Second, construction is underway on a 20-inch pipeline for crude oil between Sakhalin Island (Okha) and the Komsomol'sk oil refinery on the mainland. Construction of this pipeline probably would not have been undertaken if exports of oil from Moskal'vo were to be increased.

### B. Current Limitations

All of the major ports on the Black Sea that export oil are subject to severe climatic conditions, especially during the winter. Icing is not a particular problem -- only at Odessa are icebreakers required -- but coastal storms often force the harbors to close. At Novorossiysk, for example, an average of 80 working days per year is lost because of gale winds. Moreover, severe frosts, which sometimes accompany the gale winds, can cause damage to loading equipment. Such damage causes loss of petroleum, delays in loading, and greatly increases the danger of fire. Loading operations slow down during the winter, and rates at ports such as Odessa, Klaipeda, and even Batumi have been reduced officially by 10 to 20 percent. This step was necessary because of the difficulty in moving crude oil and heavy products through unheated hoses, for as the temperature declines, the rate of flow declines.

Silt accumulation at Klaipeda has been so great as to have warranted a downward revision of the port potential and the postponement or perhaps even abandonment of plans to connect the port with sources of oil by pipeline. To deepen the harbor to depths necessary to accommodate large tankers -- and to maintain this depth -- would be prohibitive in cost. Even handling the tankers of 4,000 to 5,000 DWT now using the port requires constant dredging of the channel. Dredging also is required to keep the Ventspils channel open, although depths of 30 feet, which are sufficient to accommodate tankers of 24,000 DWT, can be maintained in this manner.

Low-capacity pumps hamper loading operations in all the ports -- a situation that, in turn, results in high demurrage as incoming tankers stand idle. At Odessa, Novorossiysk, Tuapse, and Batumi, loading a single tanker reportedly averages about 1,100 tons per hour, but multiple loadings reduce the rate drastically -- to a reported average as low as 200 to 250 tons per hour.\*

Judging from complaints reported in the Soviet press, Soviet planners appear reluctant to allocate funds for improving loading

\* In extreme contrast, at the highly developed port facilities associated with the Baytown (Texas) oil refinery, one of the largest in the US, loading rates can reach as high as 14,000 tons per hour.

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facilities, such as pumps and hoses.\* (For loading facilities in common use in the ports of the USSR, [redacted])

[redacted] Most of the attention has been devoted to the physical expansion of the port facilities through the construction of new piers, increasing the depth of water alongside the piers, continual removal of silt, and the like. The scheduled acquisition by the Soviet fleet of tankers with increasingly greater deadweight tonnage will only underscore the general inefficiency of the pumps.

Completion of new pipelines to Novorossiysk and Tuapse in 1963-64 and to Ventspils in 1965 will relieve the railroads of a heavy burden of supplying oil to these ports but does not and will not fully guarantee the regular, uninterrupted flow of oil to the ports until these pipelines can be linked directly with fields producing crude oil. Nevertheless, a considerable improvement in means of delivery has been achieved, and such bottlenecks as may occur in oil deliveries to Black Sea ports more likely may occur at Odessa and Feodosiya, both of which will continue to depend principally on the railroads for their oil supplies.

#### C. Planned Expansion of Facilities

A number of construction programs to expand the various oil ports on the Black Sea are still underway. Most prominent among these are the construction of an offshore berth for handling petroleum at Eatumi and the completion to full capacity of the new port at Mys Sheskhariis. In addition, dredging and the renovation of existing facilities is expected to continue. For the most part, these programs are to be commensurate with additions to the capability to move oil to terminals on the Black Sea, and both actions, although implying continued increases in the export of oil from the Black Sea, also point to the adequacy of means to handle these increased exports.

Moreover, it is clear that the program of developing ports on the Black Sea has been designed primarily to provide capacity for loading tankers for increased trade in oil with non-Block countries. It is anticipated that by 1970, almost all the trade in oil with the European Satellites will be in crude oil, of which only those amounts going to Bulgaria will be handled by oceangoing tanker. The remainder, perhaps as much as 85 to 90 percent of the total deliveries to the European Satellites, will be carried by the Friendship pipeline. Although most of the oil shipped to Cuba may continue to originate from ports on the Black Sea, the greater part of this capacity will be available to handle deliveries to non-Communist countries.

\* Information does not point to any effort by the USSR to purchase such equipment abroad. Moreover, shortages of high-capacity pumps (and compressors) are typical for all sectors of the economy.

\*\* Following p. 10.

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Future growth in exports of oil from the Baltic will have to be provided largely through expansion of facilities at Ventspils, and such expansion is underway. It is estimated that quantities of oil exported through the Baltic will continue to increase, but no major displacement of the preponderant share in the total oil exported from ports on the Black Sea is believed likely. The scope of expansion of facilities on the Black Sea for exporting oil is much too broad to allow such a shift.

## II. Pipelines as a Factor in the Export of Oil from the USSR

### A. Current Role

From the early 1930's until the late 1950's the principal objective of the USSR in constructing a pipeline system was to relieve rail transport of a part of its burden. Late in 1959, however, the USSR and the European Satellites (Poland, Czechoslovakia, East Germany, and Hungary) embarked on the construction of a major international pipeline for crude oil to link new refineries under construction in these countries with Soviet sources of crude oil. This system was completed in its entirety in 1964, although parts of the line, such as those linking Brody, Uzhgorod, and Bratislava (Czechoslovakia) were placed in operation several years earlier.

Recently completed pipelines to the major Black Sea ports of Tuapse and Novorossiysk should greatly facilitate the flow of oil from producing regions to these ports. These pipelines generally will be used to replace rail transport and will supply oil in greater volumes at reduced cost. In addition, transport by pipeline is more dependable than by other means, particularly during the winter, when surface transport often is tied up.

### B. Current Limitations

By the close of 1964 the capacity of pipelines to move oil for export either to ports or to the Soviet border may have been as much as 34 million tons. As late as 1962, such capacity probably did not exceed 5 million tons (excluding that part of the Friendship pipeline between Brody and Uzhgorod). This very sharp growth in capacity of pipelines to carry oil for export will be most advantageous in the Soviet drive for additional oil markets.

The Seven Year Plan (1959-65) for construction of oil pipelines was designed to provide for (1) the linking by pipeline of all major oil refineries, in operation or under construction, with oilfields; (2) the linking of four of the European Satellites with Soviet sources of crude oil through construction of the CETA oil pipeline; and (3) support of the so-called Soviet oil offensive through construction of pipelines to terminals on the Black Sea and the Baltic Sea.

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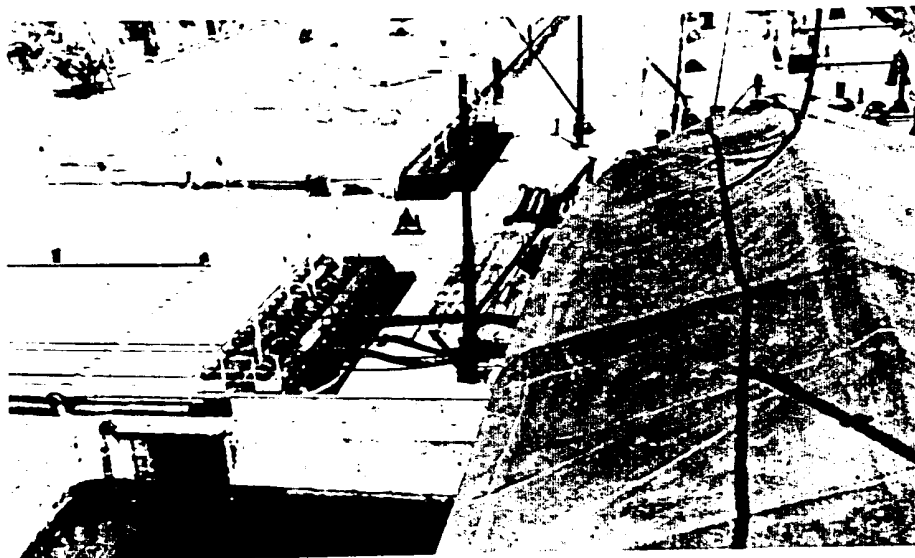


Figure 3. USSR: Hose Connections at Batumi. Batumi is the oldest port in the USSR exporting petroleum. The five berths, each with two banks of outlets, are the most elaborate in service at present in the USSR.



Figure 4. USSR: Hose Connections at Novorossiysk. Two hoses feed a tanker tied to the old petroleum pier. The connection between the left hose and right hose derrick is clearly visible. This method of handling hoses is common in all Soviet oil ports.

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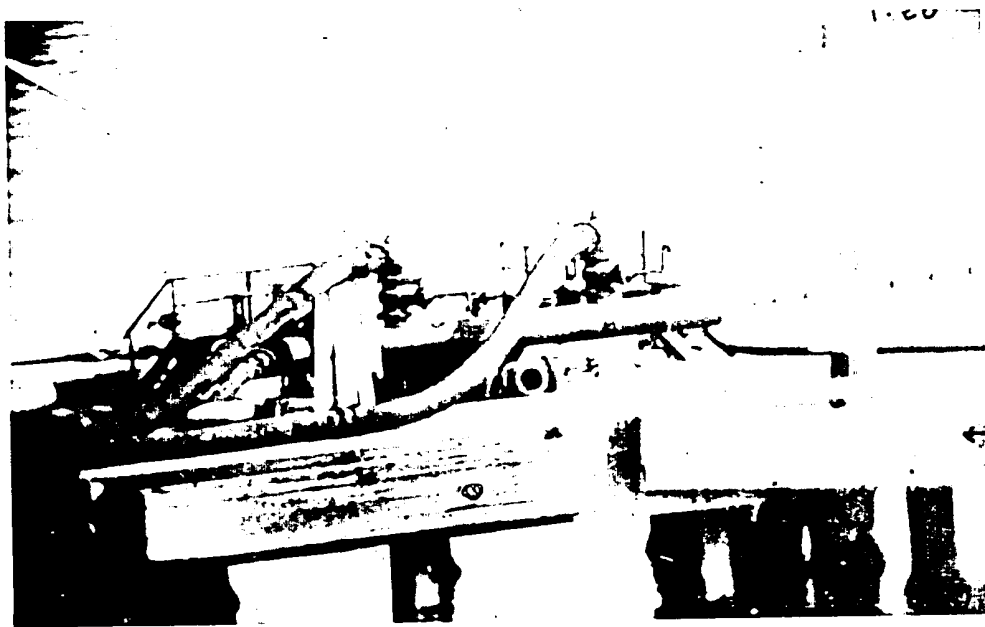


Figure 5. USSR: Hose Connections at Novorossiysk, the New Pier for Handling Petroleum. One of two hose manifolds on the new dolphin pier at Novorossiysk. The pier, which was built in 1960-61, probably represents the latest facilities for handling oil in the USSR.

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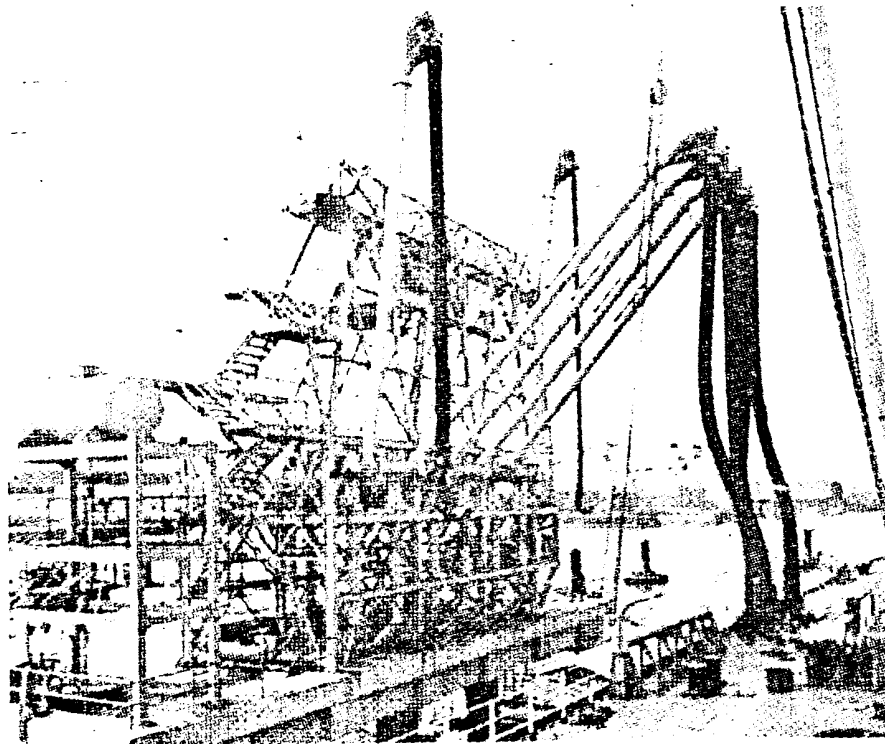


Figure 6. Iraq: Hose Connections at Fao. This photograph shows an automatic tanker loading unit typical of new facilities for handling oil now being installed in the West.

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In spite of the failure to install all of the oil pipeline lengths scheduled for 1952-65 -- actual construction probably will fall short of the original plan goal by 45 percent -- the above major objectives of the program for constructing pipelines generally will have been accomplished by the end of 1965.\* Priority status was not accorded to any single objective. In fact, completion of the CEMA pipeline was delayed about 1 year as a result both of the desire to expand the gas pipeline system as rapidly as possible and of insufficient supplies of large-diameter (particularly 40-inch) pipe.

There is no evidence to suggest that lack of pipeline carrying capacity in recent years has been a limiting factor in the Soviet drive to increase its sales of oil. Moreover, the balanced program to increase pipeline connections with oil ports indicates that growth in the capability to deliver oil to terminals on the Black Sea and the Baltic Sea should be commensurate with whatever growth is achieved in the amounts of exportable surplus oil.

C. Planned Expansion of Facilities

Other than the pipeline to Ventspils now under construction and the plan to build, beginning in 1965, a second line between Baku and Batumi, little is known regarding Soviet plans for constructing oil pipelines during 1966-70. Perhaps such plans are being held in abeyance until schedules for production of crude oil for West Siberia and the Mangyshlak Peninsula (Kazakh SSR) can be worked out. Early emergence of these regions as major oil-producing centers could drastically change the requirements for constructing oil pipelines, and several possibilities exist for such construction in the coming years. Should the USSR and Japan ultimately reach agreement on the barter of oil for steel line pipe, then the construction of a pipeline to the port of Nakhodka on the Pacific Ocean would be indicated. This pipeline, in essence, would be an eastward extension of the pipeline for crude oil from Tuymazy to Irkutsk, 3,700 km in length, that was completed in 1964. The extension would be approximately 4,400 km in length and, regardless of diameter, would require about 5 years for installation.

A second possibility would be to extend the pipeline for crude oil from Al'met'yevsk, Gor'kiy, Yaroslavl', and Kirishi another 100 km

\* Some preparatory work has been carried out at a site for a new refinery at Kremenchug in the Ukrainian SSR. This refinery is to be supplied with crude oil by means of a pipeline leading off the CEMA system. Although the pipeline is still in the planning stage, there is no reason to doubt that it could not be installed on schedule commensurate with completion of the refinery.

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to the northwest to Leningrad.\* (For pipelines carrying oil for export -- in use, under construction, or planned -- see Table 4 and the map, Figure 7.)

Table 4

USSR: Pipelines for Exporting Crude Oil: a/  
In Operation, Under Construction, or Planned for Construction  
1 January 1965

Origin	Terminus	Length (Kilometers)	Diameter (Inches)	Carrying Capacity <u>b/</u> (Million Metric Tons per Year)
Baku	Batumi	883	8	1.0
Baku	Batumi No. 2	900	N.A.	N.A.
Tikhoretsk	Tuapse	240	20	6 to 8
Tikhoretsk	Novorossiysk (Mys Sheskharis)	240	20	6 to 8
Polotsk	Ventspils	525	N.A.	N.A.
Afiyskaya	Novorossiysk	100	10	1.3
Armavir	Tuapse	220	10	1.3
Tukha	Krasnodar	102	8	1.0
Karskoye	Novorossiysk	74	N.A.	N.A.
Kuybyshev	Brest	457 <u>c/</u>	24	8 to 12
	Uzhgorod	774 <u>c/</u>	20 to 21	6 to 8

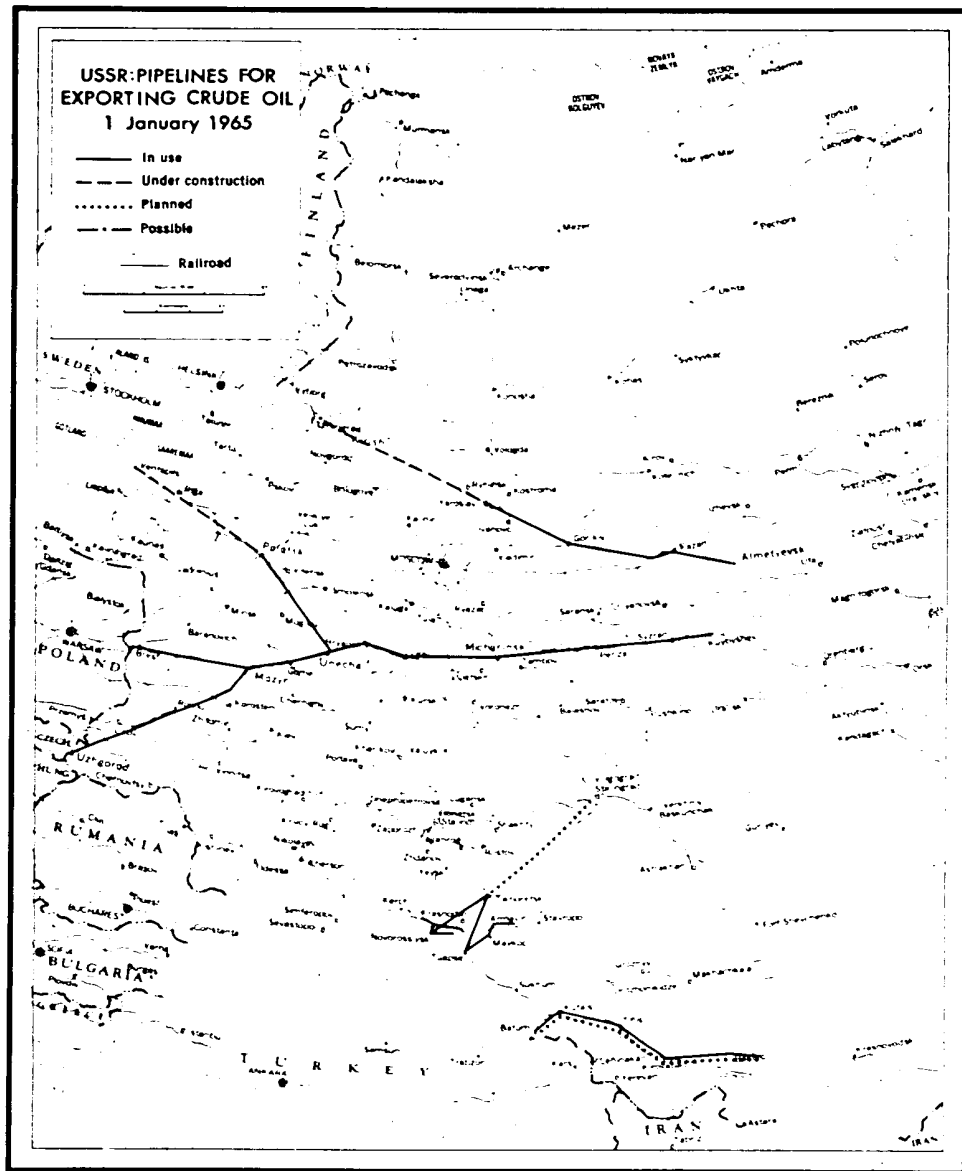
a. There are no pipelines for exporting petroleum products.

b. Based on Soviet data.

c. CEMA, or Friendship, pipeline measured from Mozyr' in the Belorussian SSR.

\* The pipeline had been completed as far as Yaroslavl' by the close of 1963. Work was to continue in 1964 on the section between Yaroslavl' and Kirishi, but no completion date has been announced.

Figure 7



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## APPENDIX A

USSR: GENERAL DESCRIPTION OF PORTS EXPORTING OILI. Black Sea Ports Exporting OilA. Major Ports1. Batumi

Batumi, the oldest port in the USSR from which oil has been exported, has been in service 60 years. A program for expanding the facilities of this port began in mid-1962. Previously the port had five principal berths for handling petroleum (see the sketch, Figure 8\*). Alongside these berths the water was 31 to 32 feet deep, a depth which meant that a T-2 tanker was the largest that could be accommodated. Additionally, two small piers in the cabotage harbor were used for petroleum.

Expansion of port facilities has consisted of dredging to increase the water depths alongside the five berths, dredging along the seaward or outer side of Neftyanoy Mole, constructing a sixth berth in the section handling petroleum, and installing a number of large oil lines for loading tankers. Additionally, and perhaps most important, an offshore loading facility is being built, which on completion, will be able to service tankers of up to 70,000 DWT.

[redacted] the depth at the first berth has been increased to at least 35 feet, which would accommodate a tanker of 35,000 DWT. A similar minimum depth presumably has been planned for the seaward side of the Neftyanoy Mole. No dates for completion of the offshore petroleum berth or of the dredging program have been announced.

Concomitant with the expansion of the port facilities, plans for construction of a new pipeline for crude oil between Baku and Batumi have been announced. This new line presumably will augment and not replace the existing pipeline system between the two points. Installation of the line is to be accomplished in relatively easy stages -- the first 250 km are to be finished in 1965 and the remaining 650 km by 1967. Presumably this construction schedule has been coordinated with the schedule for the over-all program for expanding the port.

That part of the harbor that handles petroleum is served by two principal storage areas with a total capacity estimated at about 570,000 tons. One of these storage areas is associated with the Batumi

\* Following p. 14.

S-E-C-R-E-T

oil refinery. Based on exports of petroleum from Batumi in 1963, maximum utilization of this storage capacity would provide a supply for 2 months.

2. Novorossiysk (and Mys Sheskharris)

25X1

25X1 [redacted] the port contained some of the most modern facilities for handling general cargo and petroleum

25X1 [redacted] Two piers are available for loading petroleum in tankers. The newer of these piers has an alongside water depth of 30 to 38 feet which would be adequate for tankers of 35,000 DWT (see the sketch, Figure 4). Construction of the newer pier, part of a program undertaken in recent years to expand and/or upgrade facilities in the harbor for handling petroleum, apparently was dictated by an immediate need to provide for additional berthing for tankers. Berthing for only one tanker at a time is available at the new pier. Soviet officials, who knew that the new oil port at Mys Sheskharris (see below) was soon to be opened, probably were reluctant to invest any sizable resources in the expansion of Novorossiysk and thus viewed the new pier as only a stopgap measure.

Although the older pier has alongside berthing on both sides, water depth on the northeast side is as low as 2 feet in some places and is generally sufficient only for coastal tankers. Water depth on the southwest side, however, ranges from 30 to 32 feet, and there are two berths each capable of handling a T-2-type tanker.

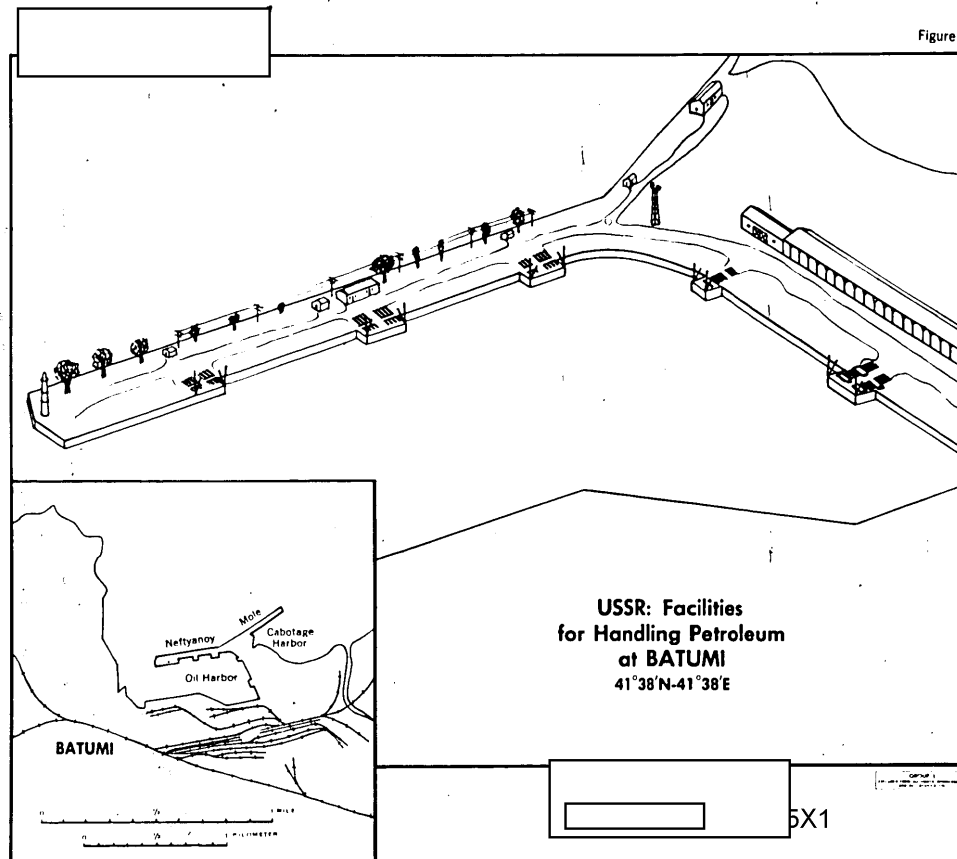
In order to use those facilities available to the fullest extent and to accommodate as many large-size tankers as possible, those tankers having drafts, when loaded, in excess of 30 feet are partly loaded first at the old pier, then topped off at the new pier.

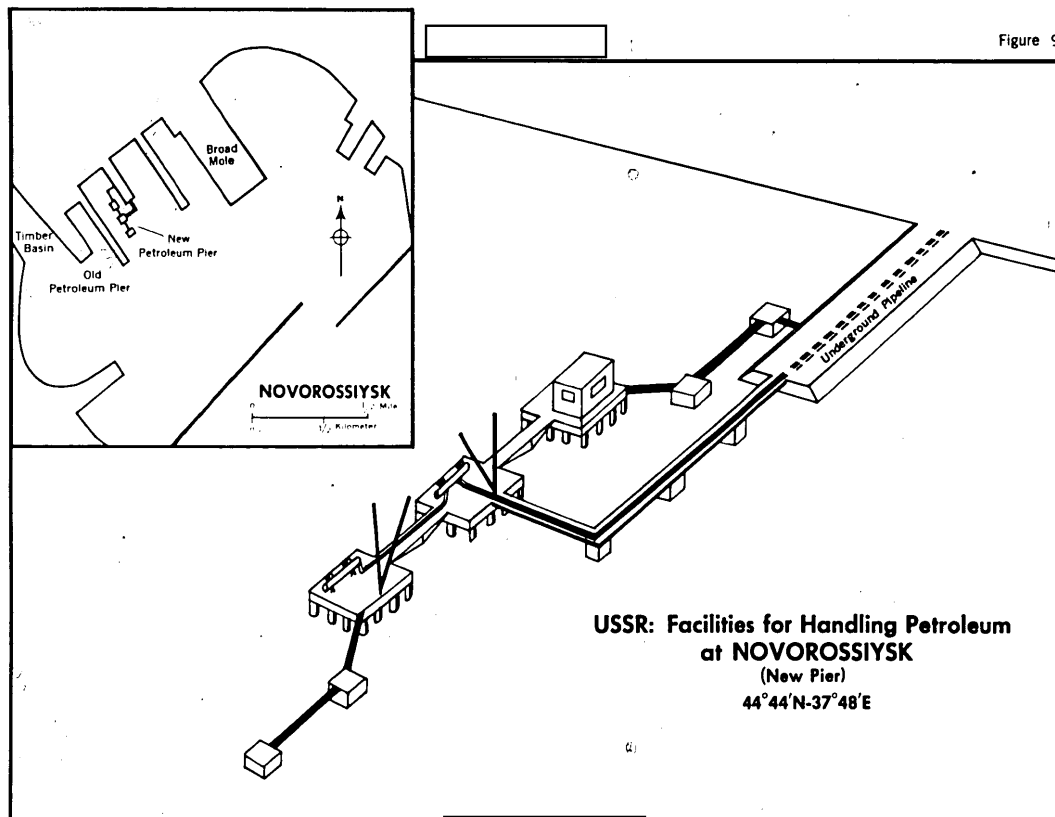
Crude oil is delivered to Novorossiysk by a number of pipelines that connect with the local oilfields. The Karskoye-Novorossiysk line may be used alternatively to carry residual fuel oil produced at the Krasnodar oil refinery. These pipelines, however, have been inadequate, and additional oil is brought to Novorossiysk by rail and by tanker.

In apparent anticipation of increased exports of crude oil and petroleum products and recognizing that the economic limit for handling petroleum at Novorossiysk probably had been reached, construction of a new port -- Mys Sheskharris -- at a point about 4 km southeast of Novorossiysk has been undertaken. Reportedly, this new port is to be the most modern and the largest port for handling petroleum in the USSR and will be capable of accommodating tankers of 100,000 DWT (see

\* The delegation also visited Murmansk, Leningrad, Odessa, Il'ichevsk, and Baku.

Figure 8





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the sketch, Figure 10\*). Arrangement of the berthing is such that no more than six supertankers can be handled at one time, but because each berth reportedly will be capable of servicing supertankers of at least 50,000 DWT, the new port will almost double the capacity for exporting oil in the Black Sea.

The capacity for storing petroleum at Novorossiysk is quite small in relation to the quantity of petroleum handled by this port on an annual basis. Analysis of available data indicates that storage is provided by two areas and that in 1963 capacity may have been about 100,000 tons. In that year, however, more than 10 million tons of petroleum were moved out of Novorossiysk -- a feat that implies a storage availability of only 3 to 4 days. Under these circumstances, any interruption in the movement of petroleum to the storage area would be reflected almost immediately in a decline in the amount of oil moving out of Novorossiysk. Commissioning of the new harbor at Mys Sheskhariis will eliminate this critical dependence on the maintenance of a continuous supply of petroleum. If the old facilities at Novorossiysk are used exclusively for handling petroleum products, as has been suggested, then the storage capacity (related to the volume of petroleum products handled in 1963) would be about 75 days' supply.

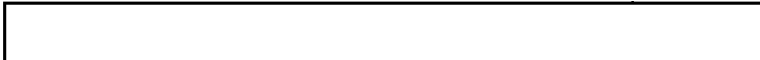
Mys Sheskhariis apparently will specialize in handling crude oil that will be moved to the port by pipeline from Tikhoretsk. This pipeline, 20 inches in diameter and 240 km in length, was completed in 1964.\*\* Regular tanker shipments from Mys Sheskhariis were anticipated for early 1965 at which time observed delays in loading at Novorossiysk should be relieved because all of the crude oil may originate at Mys Sheskhariis. It is possible that the old petroleum pier may be converted to handling dry cargo -- a situation that would leave the new pier to handle only petroleum products.

### 3. Tuapse

During 1964, facilities at Tuapse for loading petroleum were limited to one pier that could provide for the simultaneous loading of four tankers -- two loading berths on each side of the pier (see the sketch, Figure 11\*\*\*). The maximum depth of water alongside the pier probably was no more than 36 feet -- and that only at the tip of the pier. Toward the shore the depth dropped off to 18 feet. These limitations notwithstanding, the situation in 1964 was a considerable improvement over 1962, when the maximum depth alongside the pier had

\* Following p. 16.

\*\* The Tikhoretsk-Novorossiysk (Mys Sheskhariis) pipeline ultimately is to be extended inland to Volgograd, thus providing a direct pipeline link between the port and the oilfields of the Urals-Volga.



S-E-C-R-E-T

been only 32 feet, permitting the accommodation of a tanker of 20,000 DWT. For loading those tankers whose draft exceeded this depth, lighters were used. As early as 1961, however, tankers had left Tuapse with payloads in excess of 42,000 tons. Evidence also indicates that tankers were loaded at Batumi to the limit that could be handled by that port and then shifted to Tuapse where they were topped-off to capacity. Dredging reportedly began at Tuapse in 1962 to increase the alongside depth at the oil pier in order to eliminate the use of lighters for loading tankers in excess of 20,000 DWT.

Examination of the current program for expanding facilities for handling petroleum at Tuapse points to the probable continued growth in the quantities of petroleum exported from this port. Current expansion activity in the port includes the reconstruction of the Town Pier for use in handling petroleum and renovation and expansion of the existing oil pier. Thus, on completion of this expansion program, two piers will be available for handling petroleum at Tuapse. Reconstruction of the oil pier had been completed by early 1964, but other construction activity continues.

The carrying capacity of the 10-inch pipeline for crude oil, which serves the Tuapse (Ordzhonikidze) refinery, is inadequate to meet the demands both of the refinery and of export. Consequently, until completion late in 1963 of a 20-inch pipeline for carrying crude oil between Tikhoretsk and Tuapse, most of the crude oil exported from the latter port was delivered to the port by rail; smaller quantities were delivered by barge.

The Ordzhonikidze Petroleum Storage Terminal serves both the port area and the Ordzhonikidze oil refinery. Storage capacity at the terminal has been estimated to have been about 270,000 tons in 1962 -- the equivalent of about 20 days' supply.

4. Odessa

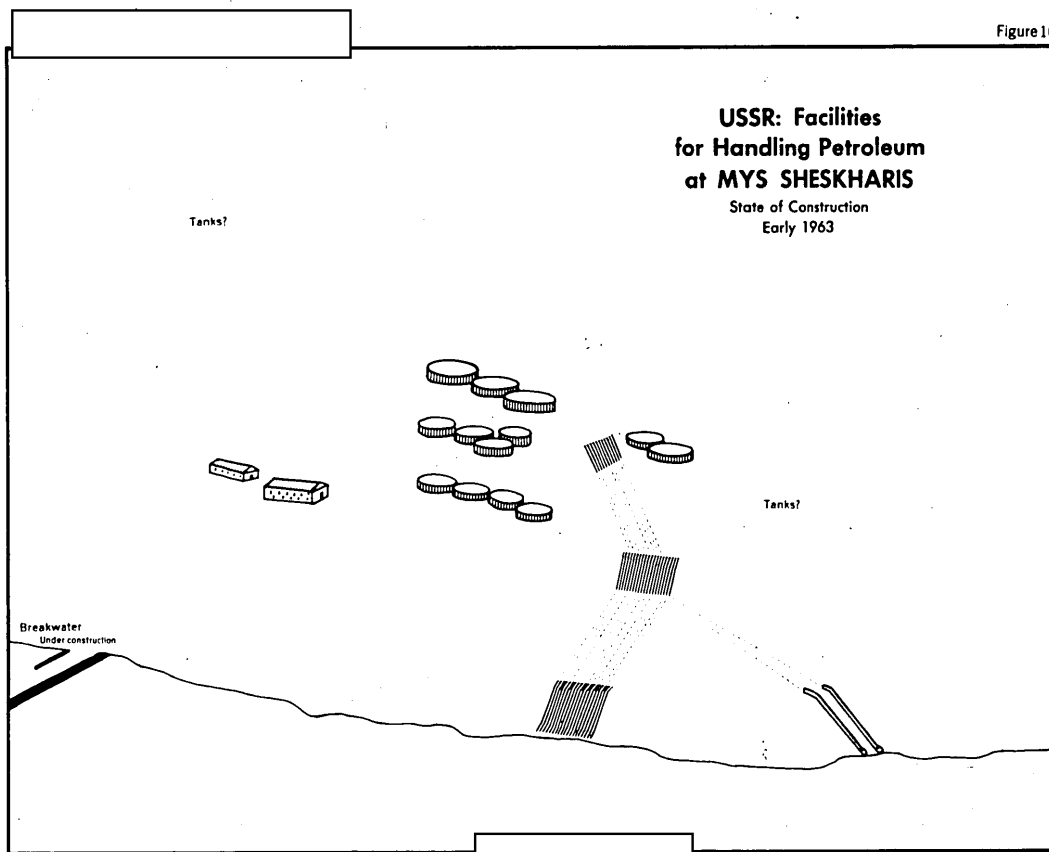
The harbor at Odessa has five berths for loading petroleum in tankers (see the sketch, Figure 12). Several years ago the depth of water alongside the berths was reported as 30 to 31 feet, but as a result of dredging, tankers with drafts up to 36 feet were loaded in 1962-63. Reportedly, deep-draft tankers are topped-off while lying at anchor outside the Odessa harbor.

Plans have been formulated to increase the depth alongside the oil berths to 40 feet, which, if carried out, would call for extensive dredging. Data indicate that the area along the north side of the petroleum pier is being reclaimed, probably in order to add more berths for tankers.

No oil pipelines serve Odessa. Consequently, all of the crude oil delivered to the area for export and/or for charge to refining

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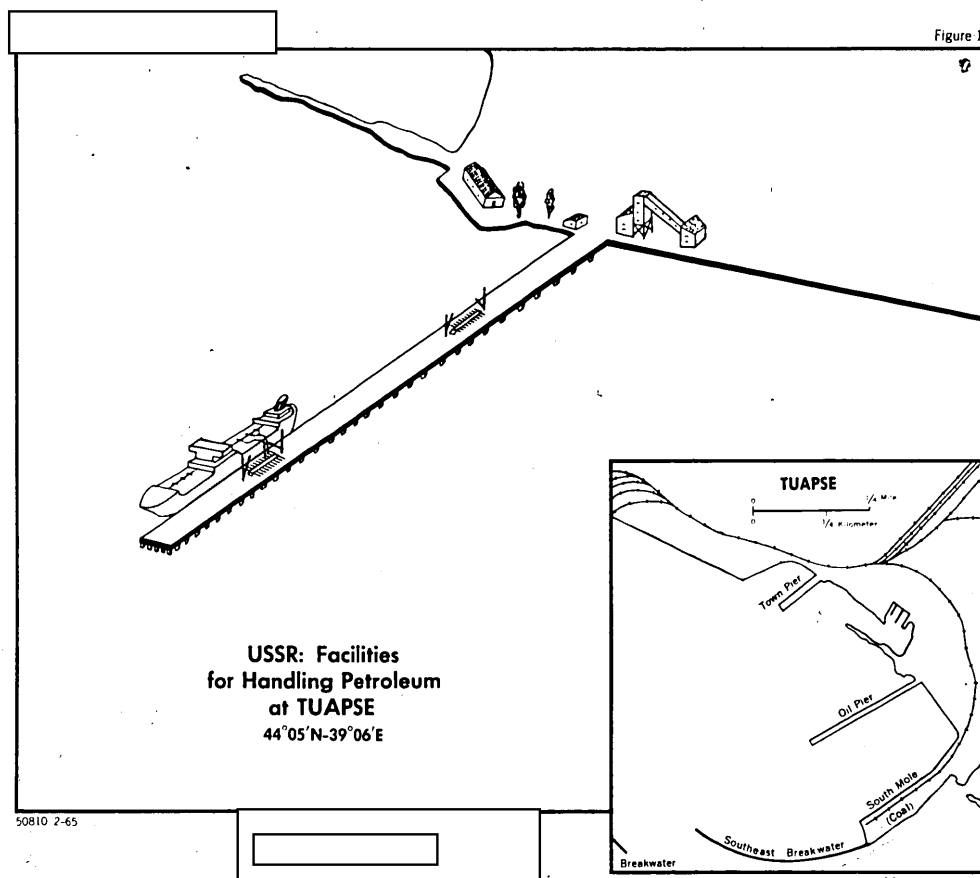
Figure 10



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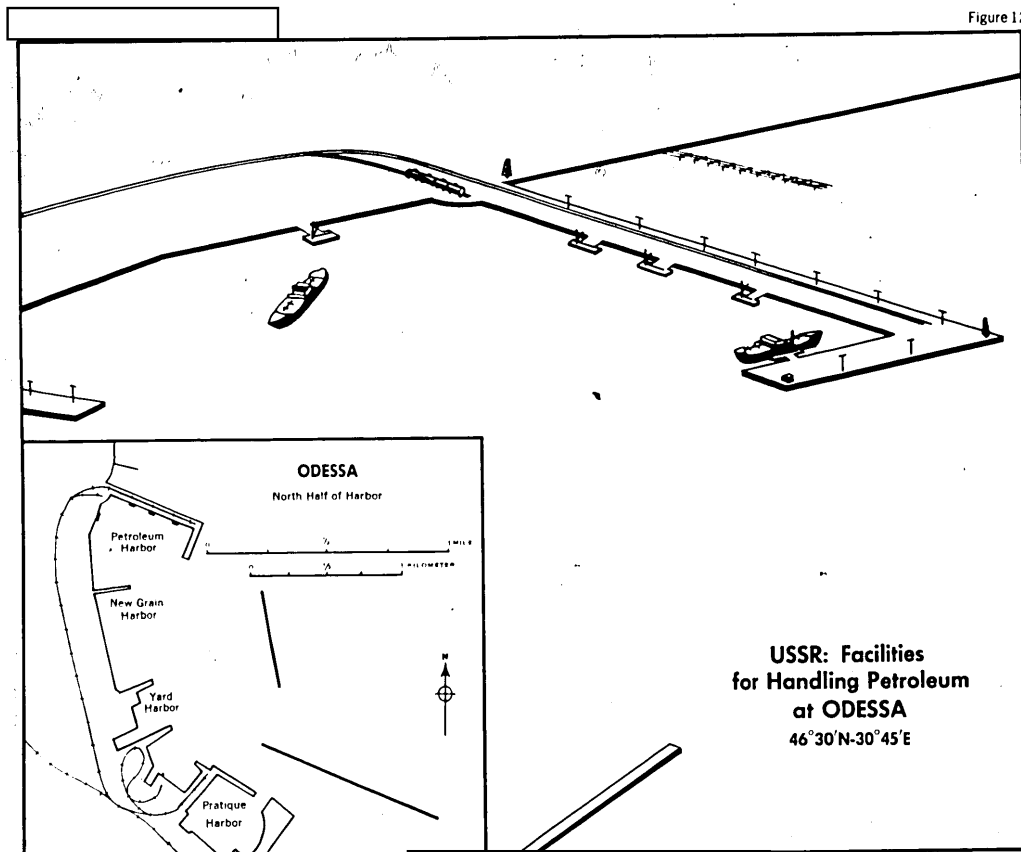


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Figure 11



Figure 12



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at the Odessa oil refinery is carried by rail. Most recently, crude oil has been transferred from the Friendship pipeline at Brody to rail tank cars. Petroleum products can be made available from the nearby Odessa oil refinery, which has direct pipeline connections with each of the five berths loading petroleum.

There has been some speculation concerning the construction of an oil pipeline to Odessa, presumably from the Kremenchug refinery, now under construction at a site approximately 350 km to the northeast, but no official plans have yet been revealed.

To relieve Odessa of some of its burden, a plan reportedly calls for construction of a petroleum port at Il'ichevsk, which is located about 15 km southwest of Odessa. Although the port of Il'ichevsk\* is partly operational at present, no facilities for handling petroleum are yet in use or known to be under construction.

There are five petroleum tank farms in the vicinity of Odessa, and each farm is connected by pipeline to each of the five petroleum berths. Total storage capacity has been estimated to be slightly less than 300,000 tons, or the equivalent of about 20 days' supply in 1962. About 40 percent of the storage capacity is located at the Romankovo tank farm which also serves the Odessa oil refinery.

B. Minor Ports

Of the several Black Sea ports handling oil for export, only Feodosiya is considered to be of minor importance. This port, which is located on the Crimean Peninsula about 100 km east of Simferopol, handles largely military cargoes, and since 1960, has exported increasing quantities of petroleum. Because Feodosiya is closed to foreign shipping, details concerning facilities for petroleum and water depths are lacking. Two petroleum wharves are known to be in operation, and in 1963 a tanker drawing about 33 feet departed from Feodosiya, but maximum depths cannot be established. A submarine pipeline permits loading tankers offshore. There are no trunk pipelines for oil into the area, and oil supplies are brought to Feodosiya by rail, probably from the Brody terminal on the Friendship line. Capacity at the two storage areas that serve the wharves has been estimated to be 100,000 barrels (about 14,000 tons), equal to about 15 days' supply in 1962.

II. Baltic Sea Ports Exporting Oil

A. Ventspils

Ventspils has become the major port exporting oil on the Baltic Sea. The port, located at the mouth of the Venta River, is one of the few Soviet Baltic ports, along with ports such as Leningrad and Riga,

\* Those storage facilities observed at Il'ichevsk are believed to be for edible oils.

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which are open to non-Communist shipping. Crude oil is shipped from Ventspils to most of the nations of Northern Europe. Exports from Ventspils have increased steadily since 1961, the first year of operation when 0.2 million tons of crude oil passed through the port, and reached 3.5 million tons of crude oil by 1963.

The harbor of Ventspils consists of two sections: the inner harbor along the banks of the Venta River and the outer harbor, which is protected by breakwaters, on the stretch of Baltic beach at the mouth of the Venta River (see the sketch, Figure 13). The facilities for handling petroleum in the outer harbor consist of two piers -- one pier has been in use for some time, and a second was completed late in December 1964.\* Plans call for the construction of a third pier, probably to be built when the crude oil pipeline from Polotsk to Ventspils is completed. All three piers are to be identical in configuration and capacity.

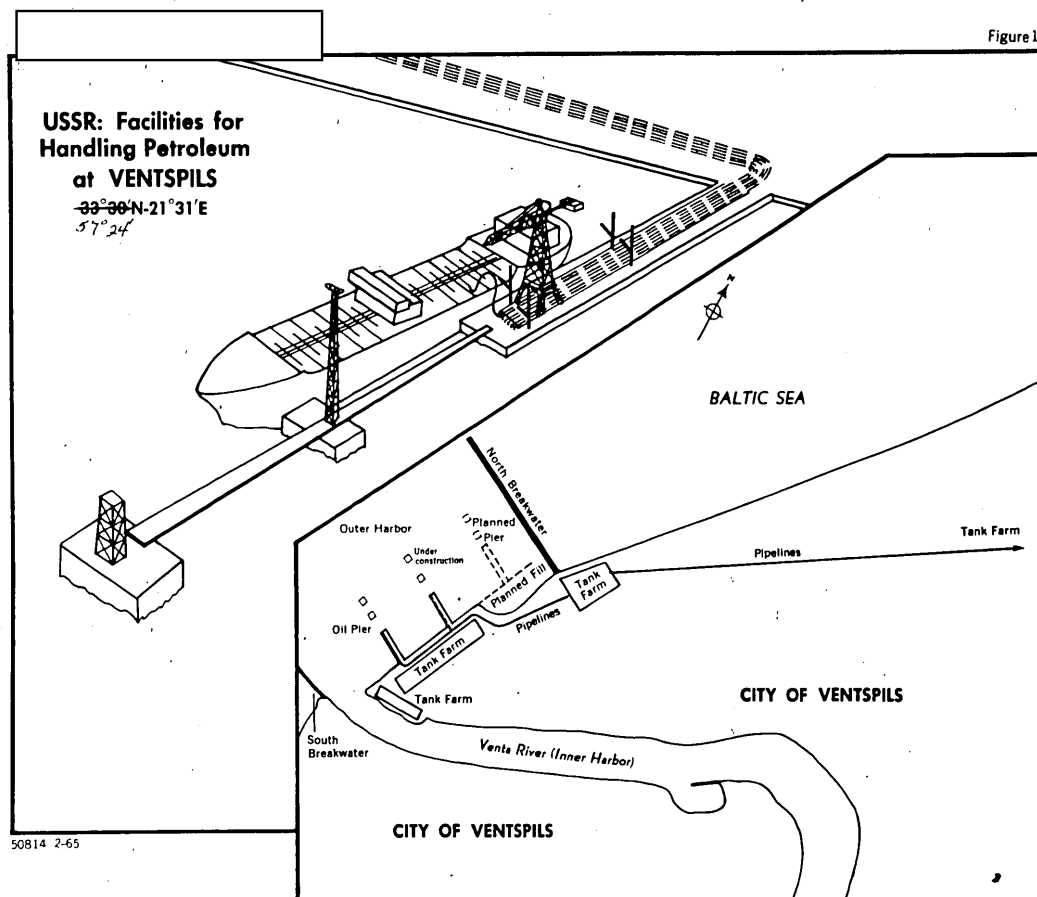
The pier currently in operation is made up of three sections. The main section is a solid filled pier about 60 feet wide extending out from the bank about 500 to 600 feet. Beyond this section, and in line, are two concrete islands or dolphins connected to the main section by a catwalk. The over-all length of this structure is about 1,000 feet and was intended to handle two tankers on each side. Because the pipelines for delivering the oil do not extend beyond the main section of the pier, the full length of the pier is not utilized. The 30-foot depth alongside the pier precludes supertankers from using these piers, but tankers with cargo capacities as high as 18,000 tons regularly operate out of Ventspils.

Connections between storage areas and the pier are made by two sets of pipelines, each containing three or four lines. Hoses are handled by four mast and boom-type derricks; two at the end of the main section at the pipeline-hose connections and two at about the middle of the main section.

Capacity for oil storage in Ventspils is estimated to be well in excess of 100,000 tons. This capacity is dispersed in four separate places in the harbor area, but the greater part of it is believed to be located in a large depot in the suburb of Mezsargs Mazkakis. This terminal, currently supplied by rail, probably is used exclusively for the storage of crude oil and probably will be the terminus of the Ventspils crude oil pipeline, which is to be completed in 1965. The terminal is believed to be connected by pipeline to a smaller tank farm, which is located adjacent to the north breakwater. The pipelines feeding the dock area connect directly with this depot. Two other

\* Both of these piers are equipped with cranes of a design generally used for handling dry cargo. The presence of such cranes on oil piers is quite unusual, and their size suggests the capability for handling extremely heavy loads.

Figure 13



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small facilities are located adjacent to the dock area. The larger of these two is directly behind the dock area and is visible from tankers moored at the pier. The smaller of these, which is made up primarily of horizontal tanks with small capacity, is on the north bank of the Venta River where it empties into the outer harbor. Neither depot is known to be connected with the dock area, and both probably are for storage of products used in bunkering ships and for local consumption.

On completion of the second and third piers for petroleum, and the crude oil pipeline, Ventspils will be among the leading ports of the USSR in the capability to handle oil for export. Some difficulties remain. The entrance to the outer harbor is subject to heavy silting and must be dredged constantly. Moreover, chunks of ice tend to collect and freeze into a pack in the northeast corner of the outer harbor, where construction of the third pier is planned.

B. Klaipeda

Klaipeda, which is located in Lithuania at the mouth of the Kurisches Haff, is one of the two ice-free ports on the Baltic Sea and was selected late in the 1950's for development as an oil export port. Since construction began in 1957, two petroleum quays, each capable of servicing a Kazbek-class tanker, have been completed and put into operation (see the sketch, Figure 14\*); a third quay is near completion. Although original plans called for a full line of products to be shipped from here, records show that, since the facility was opened, Klaipeda has exported only fuel oil. These exports have grown from a negligible amount in 1958, the first year of operation, to 2.1 million tons in 1963.

Before expansion of the facilities for petroleum, Klaipeda was equipped with two dolphin quays, which served coastal tankers and barges, and a tank farm with a capacity of about 1.700 tons. One of the dolphin quays and the tank farm are still used to supply local needs for petroleum products.

During the first few years that oil was exported from Klaipeda, only the South Petroleum Quay was available. This 200-foot-long quay accommodates tankers of almost any length, inasmuch as ships can moor along side the quay parallel to the shore. An alongside depth of 20 to 30 feet, however, limits service to Kazbek-class tankers of 12,000 DWT. The North Petroleum Quay, which became operational in 1963, has the same length and alongside depth as the South Quay and also can service tankers up to those of the Kazbek class. A third quay under construction just north of the North Quay apparently will have characteristics similar to the existing quay.

Reportedly, two pipelines lead from the larger of two storage areas to the dock area, where a manifold permits servicing of either or both quays. Because of severe low temperatures during the winter, tanks

\* Following p. 10.

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and loading bases are heated, and even in the extreme cold, loading rates of 700 tons per hour can be achieved.

Petroleum storage in Klaipeda is estimated to be between 100,000 and 200,000 tons. Based on the lower estimate, Klaipeda could have maintained an average of about 18 days' supply in 1963. The older terminal, with a capacity of about 1,700 tons, has been in use since at least 1955 and currently serves local needs. The terminal consists of about 15 surface tanks and 6 underground tanks located on the bank of the Kurisches Haff, which is adjacent to the south edge of the South Petroleum Quay. The second storage area, built since 1957, is located about 200 meters inland from the North Petroleum Quay. The area contains at least 20 tanks, each with a capacity of about 5,000 tons, as well as a number of smaller tanks of undetermined capacity. The facilities of the North Petroleum Quay may be partly allocated for local civilian or military use but are used essentially for export.

The port is supplied by rail with petroleum products -- primarily fuel oil for export -- probably from the refinery at Polotsk. In the past, lack of coordination between the shipping schedules of the railroads and those of the tanker fleet has caused temporary delays in loading; there have been occasional reports of tankers lying idle in port and waiting for delivery of oil by rail. Tank cars at Klaipeda are unloaded by an unusual method (see the photograph, Figure 15). The oil is drained from the cars directly into a concrete trough from which it is pumped to storage. Plans for developing the port apparently have called for the construction of dock facilities with small capacity.

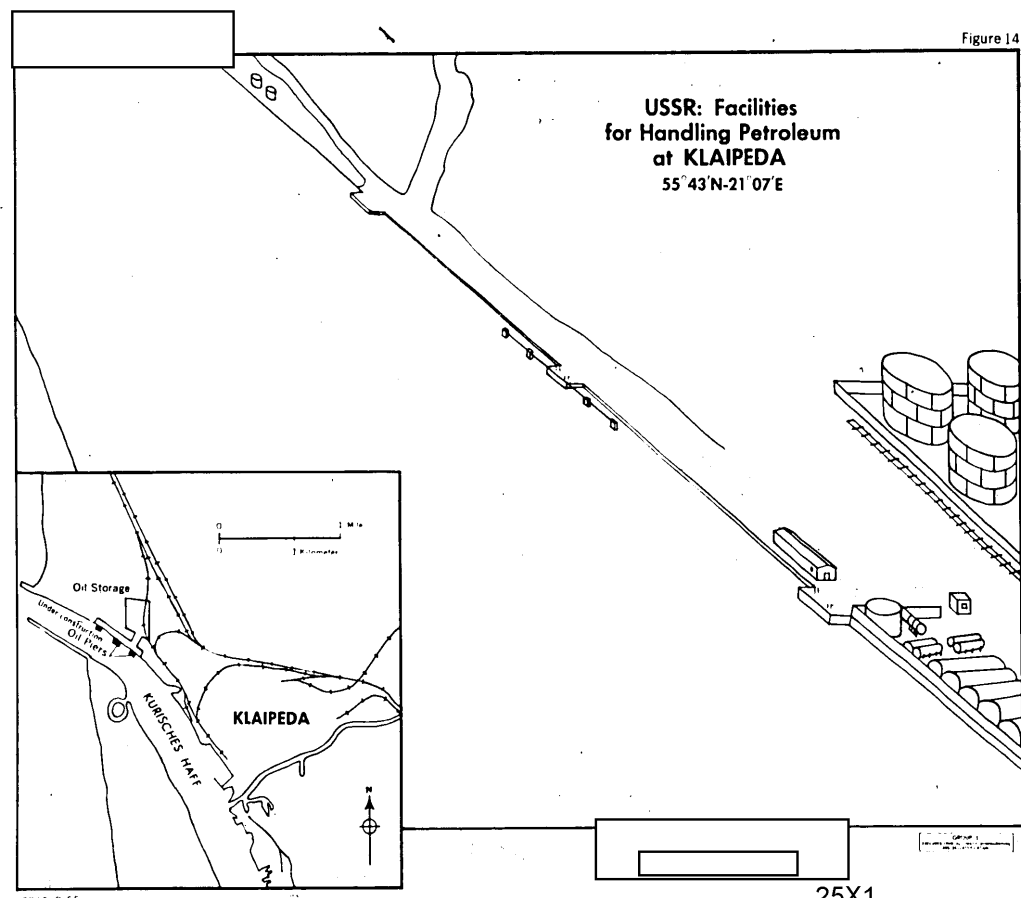
This decision is in marked contrast to development plans in the Black Sea which call for increasing the capacity of existing facilities as well as building new facilities capable of servicing supertankers. Moreover, Ventspils, the other Baltic port for handling petroleum, also has been developed to service deep-draft tankers.

Klaipeda harbor, because of its location at the mouth of the Kurisches Haff, is subject to silt accumulation, and periodic dredging is required to maintain the depth of the harbor at its current level. It may be possible to increase the depths alongside the piers to about 36 feet -- a depth that would permit tankers with a capacity of more than 30,000 tons to be serviced, but the cost of reaching that depth and then maintaining it might well be prohibitive. Moreover, a great number of the ports in Scandinavia, a principal target for exports of petroleum from the USSR, are shallow and are unable to accommodate tankers with cargoes much larger than 4,000 tons. Continuing Soviet interest in these markets is evidenced by the Soviet-Finnish trade agreement in 1964 that called for Finland to supply the USSR between 1965 and 1970 with 35 tankers, each with a capacity for cargo of about 4,000 tons. It may well be that present plans call for Klaipeda to specialize in the accommodation of small tankers.

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Figure 14



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APPENDIX E

GLOSSARY OF TERMINOLOGY

Any description or discussion of ports and shipping involves the use of a number of technical terms, the meanings of which are often misunderstood or not understood at all. This report makes use of some of the more common of these terms, and each is defined in the following compilation.

Berth -- The place assigned to a vessel in port when anchored or lying alongside a pier, a quay, a wharf, or the like, where it can load or discharge cargo.

Breakwater -- Any structure or contrivance such as a mole, mound, wall, or sunken hull serving to break the force of the waves and protect a harbor.

Bunker -- To load coal or fuel into a compartment of a vessel for its own use as distinguished from loading the fuel as cargo. The fuel a vessel burns for its own use.

Cabotage -- Coastal shipping.

C.I.F. -- Cost of material, insurance, and freight.

Deadweight tonnage (DWT) -- The vessel's carrying capacity when loaded in salt water to its approximate load line, including, in addition to cargo, the crew, bunkers, provisions, and stores.

Deep-draft tanker -- For the purposes of this report, any tanker whose draft exceeds 30 feet.

Demurrage -- Detention of a vessel by the supplier, carrier, charterer, or receiver of the cargo beyond the time allowed in the charter for loading and unloading. Such a vessel is said to be on demurrage and is paid a fixed sum, per day or per hour, agreed on in the charter in compensation for earnings it is compelled to lose.

Dolphin -- A mooring post or buffer placed at the entrance to a dock, alongside a wharf, or in the middle of a stream.

Draft -- The depth of water which a ship requires to float freely. The depth of a vessel below the waterline, measured vertically to the lowest part of the hull, propellers, or other reference points.

Fairway -- That part of a river, harbor, and so on, where the main navigable channel for vessels of larger size lies.

U-N-C-L-A-S-S-I-F-I-E-D

Gross register tonnage (GRT) -- The measurement of a vessel's capacity in gross tons (one gross register ton equals 100 cubic feet or 2.83 cubic meters). Lack of uniformity in measurement of gross tonnage of vessels of various countries exists because of variations in the method of measurement and in the number of spaces excluded from measurement. It is not, therefore, an accurate measurement of cubic capacity but rather a measurement for legal registration.

Jetty -- A structure of timber, earth, stone, or a combination of the three and projecting into the water in the nature of a pier or a dike embankment. Jetties placed at the mouth of a river or harbor tend to concentrate the current and increase the depth of the water over the entrance bar.

Kazbek\* -- A class of 70 tankers built by the USSR beginning in 1951. The Kazbek-class tanker is 478 feet long, has a 63-foot beam, draws about 28 feet when fully loaded, and has a tonnage of 12,500 DWT. Because of modifications within the class it is referred to also as the Kazbek-Leningrad class or as the Leningrad class.

Lighter -- A vessel used for off-loading cargo from a ship not at berth.

Mole -- A substantial masonry structure often serving as a breakwater on its seaward side and at the same time offering facilities on its inner side for loading and discharging ships.

Quay -- A solid masonry and earth filled structure providing a landing place for a vessel to receive or discharge cargo or passengers and designed so the vessel is moored parallel to the shoreline.

Roadstead (roads) -- A more or less open anchorage affording less protection than a harbor but more than the open sea.

Supertanker -- A tanker with a capacity greater than 24,000 DWT.

T-2 -- A class of 26 tankers built in the US during World War II for naval and convoy duty. The standard T-2 is 123 feet long, has a 68-foot beam, and a draft of 30 feet. Its deadweight capacity is about 16,800 DWT. Because of the large number of T-2 tankers in use after the war, tanker capacities are now frequently measured in "T-2 Equivalents," that is, a vessel of 16,705 DWT capable of sailing at 14.5 knots.

Top Off -- To complete loading operations of a partially loaded tanker either within the same port or in another port.

Wharf -- A structure of timber or iron built from the shore and extending into deep water of a harbor so that vessels may lie alongside close together. Also called a pier.

\* For a comparison of representative US and Soviet oil tankers, see Figure 17.

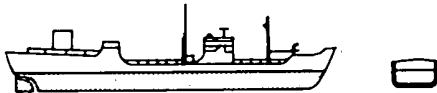
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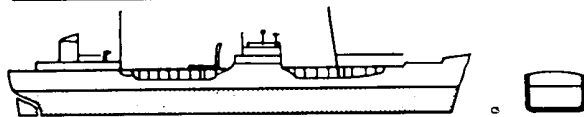
Figure 17

**USSR and US: Selected Classes of Tankers**

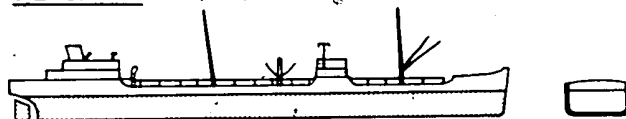
**PEVEK CLASS:** USSR, 4,500 DWT



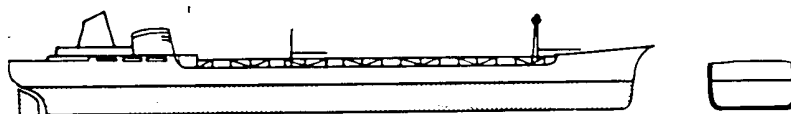
**KAZBEK-LENINGRAD CLASS:** USSR, 12,500 DWT



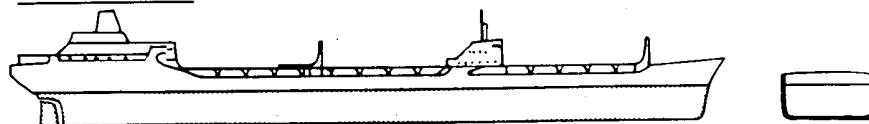
**T-2 CLASS:** USA, 16,800 DWT



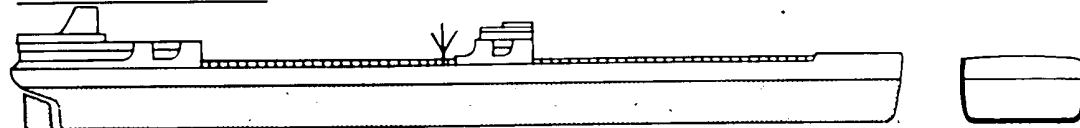
**LISICHANSK CLASS:** USSR, 35,000 DWT



**SOFIYA CLASS:** USSR, 49,000 DWT



**MANHATTAN CLASS:** USA, 106,800 DWT



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